CLAIMS

What is claimed is:

1. A viscoelastic composition comprising water, a minimum of about 0.01%w/v and a maximum of about 10%w/v of hyaluronic acid or a salt thereof and a minimum of about 0.01%w/v and a maximum of about 10%w/v of hydroxypropylmethylcellulose, wherein the viscolelastic comprises less than 0.01%w/v chondroitin sulfate and has a pseudoplasticity index having a minimum of about 60 and a maximum of about 9000.

2. The composition of claim 1, wherein the average molecular weight of the hyaluronic acid or a salt thereof is a minimum of about 500kD and a maximum of about 5000kD.

3. The composition of claim 1, wherein the average molecular weight of the hydroxypropylmethylcellulose is a minimum of about 10kD and a maximum of about 120kD.

4. The composition of claim 1, wherein the viscoelastic composition comprises a minimum amount of about 0.1%w/v and a maximum amount of about 6%w/v, hyaluronic acid or a salt thereof based upon the total weight of the viscoelastic composition.

5. The composition of claim 1, wherein the viscoelastic composition has a minimum amount of about 0.05%w/v and a maximum amount of about 5.0%w/v hydroxypropylmethylcellulose, based upon the total weight of the viscoelastic composition.

6. The composition of claim 1, wherein the osmolality of the viscoelastic composition is a minimum of about 200mOsmol/Kg and a maximum of about 400mOsmol/Kg.

7. The composition of claim 1, wherein the zero-shear viscosity of the viscoelastic composition is a minimum of about $6x10^4$ cps and a maximum of about $4x10^6$ cps.

8. The composition of claim 1, wherein the medium-shear viscosity of the viscoelastic composition is a minimum of about 10000 cps and a maximum of about 30000 cps.

9. The composition of claim 1, wherein the high-shear viscosity of the viscoelastic composition is a minimum of about 500 cps and a maximum of about 2000 cps.

10. The composition of claim 1, wherein the viscoelastic composition has a ratio of hydroxypropylmethylcellulose to hyaluronic acid or a salt thereof in a range having a minimum of about 0.01 and a maximum of about 20.

11. The composition of claim 1, wherein the viscoelastic composition further comprises a chemical scavenger. Chemical scavengers include but are not limited to tris[hydroxymethyl] aminomethane, polyols, glutatione, ascorbate, vitamin E, BHA, BHT, propyl gallate, β-carotene, trolox, metabisulfite, flavonoids, sodium formate, thiourea, carbohydrates, 2-mercaptoethanol, dimethylsulfoxide, imidazole, dimethylthiourea, SOD, salicylate, proline, indoles, sulforaphane, polyphenols, citrate, cysteine and derivatives thereof.

12. The composition of claim 1, wherein the pH of the viscoelastic composition is a minimum of about 5 and a maximum of about 8.

13. A method of temporarily maintaining the space in a cavity in human tissue, the method comprising the steps of:

(a) injecting a viscoelastic composition into the cavity, the viscoelastic composition comprises a minimum of about 0.01%w/v and a maximum of about 10%w/v hyaluronic acid or a salt thereof and a minimum of about 0.01%w/v and a maximum of about 10%w/v hydroxypropylmethylcellulose, wherein the viscoelastic composition comprises less than 0.01%w/v chondroitin sulfate; and

(b) removing the viscoelastic composition from the cavity.

14. The method of claim 13, wherein the average molecular weight of the hyaluronic acid or a salt thereof is a minimum of about 1000kD and a maximum of about 3000kD.

15. The method of claim 13, wherein the average molecular weight of the hydroxypropylmethylcellulose is a minimum of about 12kD and a maximum of about 86kD.

16. The method of claim 13, wherein the viscoelastic composition comprises a minimum amount of about 1%w/v and a maximum amount of about 3%w/v,

hyaluronic acid or a salt thereof based upon the total weight of the viscoelastic composition.

17. The method of claim 13, wherein the viscoelastic composition has a minimum amount of about 0.1%w/v and a maximum amount of about 2%w/v hydroxypropylmethylcellulose, based upon the total weight of the viscolelastic material.

18. The method of claim 13, wherein the osmolality of the viscoelastic composition is a minimum of about 200mOsmol/Kg and a maximum of about 400mOsmol/Kg.

19. The method of claim 13, wherein the zero-shear viscosity of the viscoleastic material is a minimum of about $8x10^5$ cps and a maximum of about $3.5x10^6$ cps.

20. The method of claim 13, wherein the medium-shear viscosity of the viscoelastic composition is a minimum of about 13000 cps and a maximum of about 25000 cps.

21. The method of claim 13, wherein the high-shear viscosity of the viscoelastic composition is a minimum of about 700 cps and a maximum of about 1300 cps.

22. The method of claim 13, wherein the viscoelastic composition has a ratio of hydroxypropylmethylcellulose to hyaluronic acid or a salt thereof in a range having a minimum of about 0.1 and a maximum of about 20.

23. The method of claim 13, wherein the viscoelastic composition further comprises a chemical scavenger.

24. The method of claim 13, wherein the pH of the viscoelastic composition is a minimum of about 6.5 and a maximum of about 7.5.

25. The method of claim 13, wherein the cavity is the anterior chamber of the eye or the capsular bag.

26. A method of protecting tissue from trauma during a surgical procedure, the method comprising the steps of:

(a) coating at least a portion of the tissue with a viscoelastic composition comprising a minimum of about 0.01%w/v and a maximum of about 10%w/v hyaluronic acid or a salt thereof and a minimum of about 0.01%w/v and a maximum of about

10%w/v hydroxypropylmethylcellulose, wherein the viscoelastic composition comprises less than 0.01%w/v chondroitin sulfate;

(b) performing a surgical procedure near the tissue after the step of (a) coating; and

(c) removing at least a portion of the viscoelastic composition from the tissue after the step (b) performing.

27. The method of claim 26, wherein the step of (a) coating covers at least a portion of the tissue in an anterior chamber of an eye.

28. The method of claim 26, wherein the step of (a) coating covers at least a portion of the tissue in a capsular bag of an eye.

29. The method of claim 26, wherein the average molecular weight of the hyaluronic acid or a salt thereof is a minimum of about 1000kD and a maximum of about 3000kD.

30. The method of claim 26, wherein the average molecular weight of the hydroxypropylmethylcellulose is a minimum of about 12kD and a maximum of about 86kD.

31. The method of claim 26, wherein the viscoelastic composition comprises a minimum amount of about 1%w/v and a maximum amount of about 3%w/v, hyaluronic acid or a salt thereof based upon the total weight of the viscoelastic composition.

32. The method of claim 26, wherein the viscoelastic composition has a minimum amount of about 0.1%w/v and a maximum amount of about 2%w/v hydroxypropylmethylcellulose, based upon the total weight of the viscolelastic material.

33. The method of claim 26, wherein the osmolality of the viscoelastic composition is a minimum of about 200mOsmol/Kg and a maximum of about 400mOsmol/Kg.

34. The method of claim 26, wherein the zero-shear viscosity of the viscoleastic material is a minimum of about $8x10^5$ cps and a maximum of about $3.5x10^6$ cps.

35. The method of claim 26, wherein the medium-shear viscosity of the viscoelastic composition is a minimum of about 13000 cps and a maximum of about 25000 cps.

36. The method of claim 26, wherein the high-shear viscosity of the viscoelastic composition is a minimum of about 700 cps and a maximum of about 1300 cps.

37. The method of claim 26, wherein the viscoelastic composition has a ratio of hydroxypropylmethylcellulose to hyaluronic acid or a salt thereof in a range having a minimum of about 0.1 and a maximum of about 20.

38. The method of claim 26, wherein the viscoelastic composition further comprises a chemical scavenger.

39. The method of claim 26, wherein the pH of the viscoelastic composition is a minimum of about 6.5 and a maximum of about 7.5.

40. A package for a viscoelastic composition, the package comprising a syringe containing a viscoelastic composition comprising a minimum of about 0.01%w/v and a maximum of about 10%w/v hyaluronic acid or a salt thereof and a minimum of about 0.01%w/v and a maximum of about 10%w/v hydroxypropylmethylcellulose, wherein the viscoelastic composition comprises less than 0.01%w/v chondroitin sulfate.

41. The package of claim 40, wherein the syringe has an outlet port, the package further comprising a cannula configured to sealably connect to the outlet port having a maximum inner diameter of about 2 mm. Typically, the maximum inner diameter is about 1.8 mm, about 1.5 mm or about 1 mm. Generally, the minimum inner diameter is about 0.8 mm, about 0.6 mm or about 0.4 mm.

42. The package of claim 40, wherein viscoelastic composition requires a maximum force of 30 N to pass through a stainless steel cannula having a length of 2.2 cm and an inner diameter of 0.5 mm at a delivery rate of 0.02 ml/sec. Preferably, the viscoelastic composition requires a maximum force of about 27 N, about 25 N, about 20 N or about 18 N to pass through a stainless steel cannula having a length of 2.2 cm and an inner diameter of 0.5 mm at a delivery rate of 0.02 ml/sec.

43. The package of claim 40, wherein the average molecular weight of the hyaluronic acid or a salt thereof is a minimum of about 1000kD and a maximum of about 3000kD.

44. The package of claim 40, wherein the average molecular weight of the hydroxypropylmethylcellulose is a minimum of about 12kD and a maximum of about 86kD.

45. The package of claim 40, wherein the viscoelastic composition comprises a minimum amount of about 1%w/v and a maximum amount of about 3%w/v, hyaluronic acid or a salt thereof based upon the total weight of the viscoelastic composition.

46. The package of claim 40, wherein the viscoelastic composition has a minimum amount of about 0.1%w/v and a maximum amount of about 2%w/v hydroxypropylmethylcellulose, based upon the total weight of the viscolelastic material.

47. The package of claim 40, wherein the osmolality of the viscoelastic composition is a minimum of about 200mOsmol/Kg and a maximum of about 400mOsmol/Kg.

48. The package of claim 40, wherein the zero-shear viscosity of the viscoleastic material is a minimum of about $8x10^5$ cps and a maximum of about $3.5x10^6$ cps.

49. The package of claim 40, wherein the medium-shear viscosity of the viscoelastic composition is a minimum of about 13000 and a maximum of about 25000.

50. The package of claim 40, wherein the high-shear viscosity of the viscoelastic composition is a minimum of about 700 and a maximum of about 1300.

51. The package of claim 40, wherein the viscoelastic composition has a ratio of hydroxypropylmethylcellulose to hyaluronic acid or a salt thereof in a range having a minimum of about 0.1 and a maximum of about 20.

52. The package of claim 40, wherein the viscoelastic composition further comprises a chemical scavenger.

53. The package of claim 40, wherein the pH of the viscoelastic composition is a minimum of about 6.5 and a maximum of about 7.5.

54. A method of replacing a natural lens from an eye, the method comprising the steps of:

(a) providing a passage through a sclera into an anterior chamber of the eye;

(b) removing at least a portion of the aqueous humor from the anterior chamber;

(c) inserting a viscoelastic composition into the anterior chamber, the viscoelastic composition comprises a minimum of about 0.01%w/v and a maximum of about 10%w/v hyaluronic acid or a salt thereof and a minimum of about 0.01%w/v and a

maximum of about 10%w/v hydroxypropylmethylcellulose, wherein the viscoelastic composition comprises less than 0.01%w/v chondroitin sulfate;

(d) removing the corneal lens from the capsular bag of the eye;

(e) injecting the viscoelastic composition into the capsular bag; and

(f) inserting an intraocular lens into the capsular bag.

55. The method of claim 54, further comprising the step of removing at least a portion of the viscoelastic composition from the capsular bag.

56. The method of claim 54, further comprising the step of removing at least a portion of the viscoelastic composition from the anterior chamber.

57. The method of claim 54, further comprising the step of suturing the sclera after the step (g) inserting an intraocular lens.

58. The method of claim 54, wherein the average molecular weight of the hyaluronic acid or a salt thereof is a minimum of about 1000kD and a maximum of about 3000kD.

59. The method of claim 54, wherein the average molecular weight of the hydroxypropylmethylcellulose is a minimum of about 12kD and a maximum of about 86kD.

60. The method of claim 54, wherein the viscoelastic composition comprises a minimum amount of about 1%w/v and a maximum amount of about 3%w/v, hyaluronic acid or a salt thereof based upon the total weight of the viscoelastic composition.

61. The method of claim 54, wherein the viscoelastic composition has a minimum amount of about 0.1%w/v and a maximum amount of about 2%w/v hydroxypropylmethylcellulose, based upon the total weight of the viscolelastic material.

62. The method of claim 54, wherein the osmolality of the viscoelastic composition is a minimum of about 200mOsmol/Kg and a maximum of about 400mOsmol/Kg.

63. The method of claim 54, wherein the zero-shear viscosity of the viscoleastic material is a minimum of about $8x10^5$ cps and a maximum of about $3.5x10^6$ cps.

64. The method of claim 54, wherein the medium-shear viscosity of the viscoelastic composition is a minimum of about 13000 and a maximum of about 25000.

65. The method of claim 54, wherein the high-shear viscosity of the viscoelastic composition is a minimum of about 700 and a maximum of about 1300.

66. The method of claim 54, wherein the viscoelastic composition has a ratio of hydroxypropylmethylcellulose to hyaluronic acid or a salt thereof in a range having a minimum of about 0.1 and a maximum of about 20.

67. The method of claim 54, wherein the viscoelastic composition further comprises a chemical scavenger.

68. The method of claim 54, wherein the pH of the viscoelastic composition is a minimum of about 6.5 and a maximum of about 7.5.